

Adrenalectomy by Retroperitoneal Laparoendoscopic Single Site Surgery

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ABSTRACT

Background: Laparoscopic adrenalectomy is the current standard for treatment of benign adrenal disease. To reduce the invasiveness of surgery, new techniques have been recently proposed, such as mini-laparoscopy, natural orifice transluminal endoscopic surgery, and laparoendoscopic single site surgery (LESS). Herein, we describe one case of adrenalectomy by retroperitoneal LESS using conventional laparoscopic instruments and ports.

Case Report: A 52-year-old female patient with an incidental finding of a 3-cm mass in the left adrenal was referred to us. Preoperative blood concentrations of catecholamines, aldosterone, and cortisol, and urinary excretion of vanilmandelic acid were normal. She underwent an adrenalectomy by retroperitoneal LESS using conventional instruments and ports. Operative time and estimated blood loss were 82 minutes and <50cc, respectively. She was discharged 12 hours after surgery. No intra- or postoperative complications occurred. Pathological analysis of the specimen identified an adrenal cortical adenoma.

Conclusion: Adrenalectomy by retroperitoneal LESS using conventional laparoscopic instruments is feasible. Further studies must be performed to evaluate safety, indications and benefits of this approach.

Key Words: Adrenalectomy, Laparoscopy, Retroperitoneoscopy, Transumbilical surgery, Minimally invasive surgery, Single-access.

INTRODUCTION

Since the initial description of laparoscopic adrenalectomy in 1992,¹ the management of adrenal disease has evolved dramatically. Nowadays, laparoscopic adrenalectomy is considered the standard of care for benign adrenal lesions,²⁻⁵ resulting in less postoperative pain and morbidity, as well as improved cosmetic results with respect to its open counterpart.⁵⁻⁷

The laparoscopic operation can be performed via 3 different approaches: the lateral transperitoneal, the lateral retroperitoneal, or the posterior approach,⁸ using 3 to 5 ports.^{2,9,10} The safety and efficacy of these techniques have already been documented, and each respective approach offers a unique set of advantages and disadvantages.^{3,4,11,12}

Recent developments regarding laparoscopy have been directed toward further reducing morbidity and improving the cosmetic outcome. These include the use of mini-laparoscopic 2-mm needle-ports,^{13,14} use of natural orifices,¹⁵⁻¹⁸ and more recently, use of transumbilical access (or laparoendoscopic single site surgery, LESS) by laparoscopy¹⁹ or retroperitoneoscopy.²⁰

In this article, we describe one case of adrenalectomy by retroperitoneal LESS using conventional laparoscopic instruments and ports.

CASE REPORT

A 52-year-old female patient required medical assistance due to left lower quadrant abdominal pain. She underwent a CT scan that showed acute diverticulitis and a 3-cm lesion in the left adrenal. After clinical management of the diverticulitis, she was referred to us for the treatment of the adrenal mass. She had a previous history of moderate hypertension requiring 2 antihypertensive agents. A preoperative workup included blood concentrations of catecholamines, aldosterone, and cortisol, and urinary excretion of vanilmandelic acid, which were all normal.

She was advised to undergo an adrenalectomy by retroperitoneal LESS. Informed consent was obtained before the surgery.

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A modified 5-mm trocar was used to try to reduce external clashing of the instruments and to improve range of motion (**Figure 1A**).

While the patient was under general anesthesia, she was positioned in a right lateral decubitus. The axilla was protected with a small pillow, and the arm was maintained on an armrest in a functional position.

The skin was incised longitudinally for 2cm, 4cm below the 12th left costal arch in the left posterior axillary line (**Figures 1B and 1C**). After blunt dissection of the subcutaneous tissue, the left lumbar muscle and its fascia were identified and retracted. The retroperitoneum was reached, and the initial dissection was performed digitally. A 10-mm trocar was placed, and the retroperitoneal space was achieved using CO₂ gas and the 30-degree endoscope. Two additional 5-mm adjacent trocars were placed (**Figure 1C**). In this way, the surgeon worked using 2 ports with the instruments in parallel.

The first landmark identified was the left psoas muscle. In a medial direction, the left genitofemoral nerve was identified above the psoas tendon.

Dissection was performed to identify the left kidney and its renal vein (**Figure 2A**). This vein was dissected up to the exposition of the adrenal vein (**Figure 2B**), which was clipped and divided. The adrenal artery was also identi-

fied and clipped (**Figure 2C**). Electrocautery was used to free the superior, lateral, posterior, and medial attachments of the adrenal gland (**Figure 2D**). After releasing the gland, it was put in a bag and held by a grasper. The trocars were removed, and all 3 adjacent skin incisions were united. The opening in the lumbar muscle was enlarged, and the bag was retrieved (**Figure 1D**).

The procedure was performed successfully in 82 minutes. Estimated blood loss was <50cc. Each intraoperative step could be accomplished with confidence, similar to standard multi-port laparoscopy. No intraoperative complications occurred.

The patient received clear liquids 6 hours after the procedure and was discharged from the hospital 12 hours after surgery. No complications were observed on follow-up postoperative consultations on days 7 and 30. Pathology analysis of the specimen identified an adrenal cortical adenoma.

DISCUSSION

Both the transabdominal and the retroperitoneal laparoscopic approaches represent a significant benefit in terms of patient recovery as opposed to open surgery, and in the past decade, laparoscopic adrenalectomy has become the procedure of choice for removing benign adrenal pro-

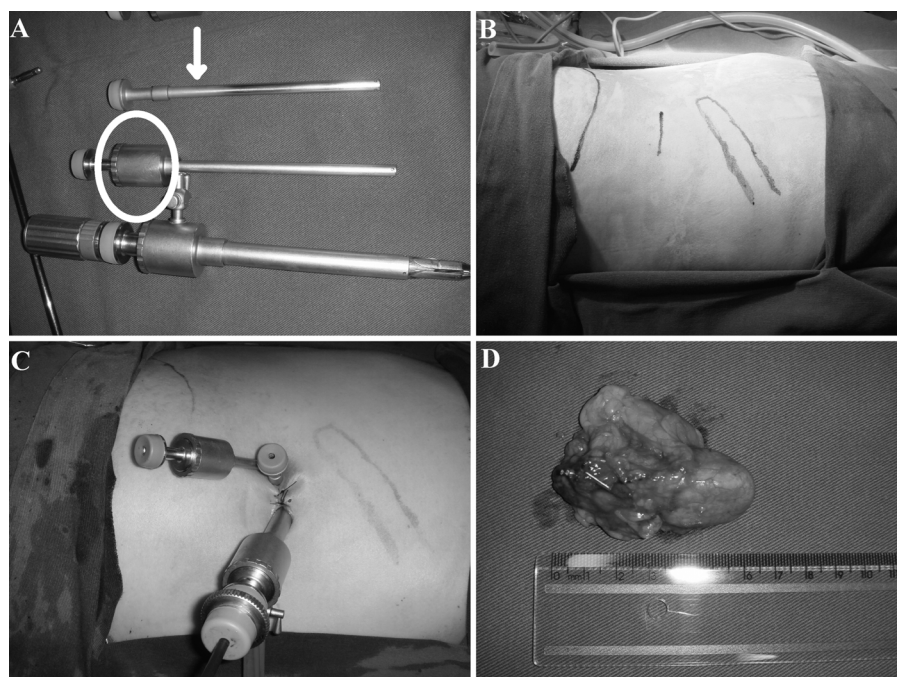


Figure 1. (A) Modified trocar for LESS (arrow). (B) Skin incision. (C) Position of the trocars. (D) Surgical specimen.

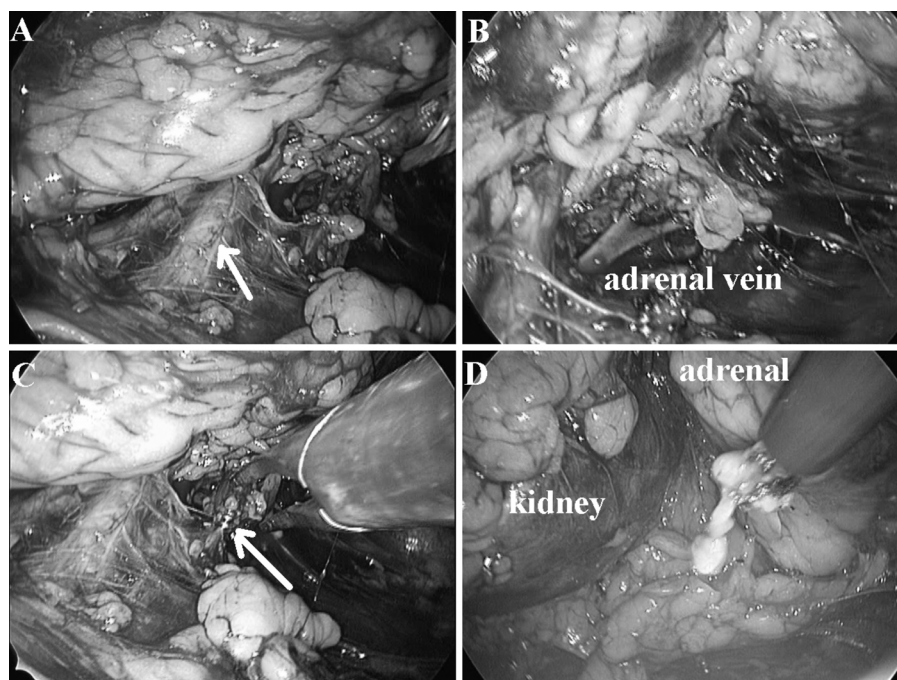


Figure 2. (A) Renal artery (arrow) and vein (crossing posterior to the artery). (B) Adrenal vein dissected. (C) Placement of 5mm clips in the adrenal artery. (D) Dissection of the adrenal from the kidney.

cesses. Laparoscopy provides a magnified view of the operative field, allowing the precise identification of small vessels, and a more precise dissection with less blood loss compared with open surgery.¹⁰ Compared with open procedures, laparoscopic adrenalectomy has been shown to be associated with reduced narcotic requirements, better cosmesis, shorter hospital stay and convalescence.⁵⁻⁷

The transperitoneal approach is more familiar to the general surgeon. It provides complete exposure of the superior retroperitoneum and allows for examination/therapy of the remainder of the peritoneal cavity. Even larger adrenal masses (>6cm) are amenable to transperitoneal dissection and resection. However, the transperitoneal approach increases the risk of injury to abdominal viscera, and bilateral transperitoneal adrenalectomies cannot be accomplished without repositioning the patient.⁸

The retroperitoneal approach is more familiar to the urologic surgeon.⁸ In this surgical approach, (1) abdominal viscera do not compromise the exposition of the structures,^{21,22} (2) there is no need for colon mobilization to reach the retroperitoneal space, reducing operative time, (3) no inconvenient adhesions develop when performed in patients who underwent multiple previous abdominal surgeries, and (4) there is a reduced incidence of postoperative ileus and intraperitoneal organ lesions, because

there is no violation of the peritoneal cavity.²³ Disadvantages include a restricted working space, poor definition of anatomic structures, allowing loss of anatomic landmarks, and limitation of the movements.²² Theoretically, the small area for retroperitoneal dissection limits the size of glands amenable to this technique.⁸

Laparoscopic posterior adrenalectomy offers a more direct access to the adrenal gland, minimizing the need for intraabdominal dissection. The first structure identified in this procedure is, in fact, the adrenal gland. It offers the advantage of the dissection without the interference of the intraabdominal organs. This approach also facilitates dissection in the individual with previous intraabdominal surgery by avoiding adhesions. Furthermore, there is no need to reposition the patient for bilateral tumors. The disadvantage of laparoscopic posterior adrenalectomy seems to be the limited space that determines the size of the tumor removed.¹⁰

Although laparoscopic surgery is considered a minimally invasive procedure, retrieval of laparoscopically resected specimens often requires enlargement of one of the ports or an additional incision. At the end of the procedure, patients generally have 3 to 5 incisions, each from 1cm to 4cm in length. Potential incision-related morbidity comprises (1) poorer cosmetic results, (2) injury to cutaneous

nerves and chronic pain, (3) subcutaneous bleeding, and (4) incisional hernia development.²⁴

Recently some authors have been using alternative techniques to diminish the above-mentioned incision-related morbidity, such as specimen morcellation,¹⁰ transvaginal extraction,²⁵ natural orifice transluminal endoscopic surgery (NOTES),^{15–18} and transumbilical surgery [also called E-NOTES (embryonic natural orifice transumbilical endoscopic surgery),²⁶ transumbilical endoscopic surgery (TUES), natural orifices transumbilical surgery (NOTUS), single-port, single-access, single-incision, keyhole surgery, or laparoendoscopic single site surgery (LESS), all based on the principle of a single abdominal incision to insert articulating laparoscopic instruments].^{19,24,26,27} The feasibility of the aforementioned technique to perform an adrenalectomy was demonstrated by our group¹⁹ using conventional instruments and ports.

To associate the advantages of the minimally invasive surgery with single access to those of the retroperitoneoscopic approach, the retroperitoneal LESS was proposed to our patient with an adrenal incidentaloma. Classic indications for surgery are features suggestive of malignancy, hormone hypersecretion, and lesions >6cm.²⁸ Surgical treatment of patients with nonhypersecretory adrenal incidentalomas <4cm in diameter is controversial, and these patients can be followed up clinically and by serial radiological scanning at regular intervals. We were able to perform the procedure using conventional instruments and 3 adjacently placed trocars. No major obstacles or difficulties were seen during the surgery. Because all the ports were placed adjacently, they were easily united in a single 4-cm incision to retrieve the specimen.

Disadvantages of the LESS technique include (1) the parallel and close lie of the right- and left-hand instrument shafts tends to result in “crowding” of the laparoscope and instruments,^{26,29,30} (2) the clashing of instruments and the laparoscope is common and, as such, significant coordination between the surgeon and the camera person is essential,^{30,31} (3) dissection through a single port is more difficult than in conventional multi-port laparoscopy, because of the lack of instrument triangulation.^{29,30}

CONCLUSION

In this article, we confirmed the feasibility of adrenalectomy by retroperitoneal LESS using conventional laparoscopic instruments. It can be considered a potential alternative for traditional laparoscopic surgery, but further comparative studies and larger series on retroperitoneal

and transperitoneal LESS are essential to evaluate the safety, indications, and benefits of each of these techniques and the potential advantages over the currently established conventional laparoscopy.

References:

1. Gagner M, Lacroix A, Bolté E. Laparoscopic adrenalectomy in Cushing's syndrome and pheochromocytoma. *N Engl J Med*. 1992;327:1033.
2. Marescaux J, Rubino F, Mutter D. Laparoscopic left adrenalectomy. *Operative Techniques General Surgery*. 2002;4:309–321.
3. Smith CD, Weber CJ, Amerson JR. Laparoscopic adrenalectomy: new gold standard. *World J Surg*. 1999;23:389–396.
4. Kebebew E, Siperstein AE, Duh QY. Laparoscopic adrenalectomy: the optimal surgical approach. *J Laparoendosc Adv Surg Tech A*. 2001;11:409–413.
5. Gagner M, Pomp A, Heniford BT, Pharand D, Lacroix A. Laparoscopic adrenalectomy: lessons learned from 100 consecutive procedures. *Ann Surg*. 1997;226:238–246.
6. Hazzan D, Shiloni E, Golijanin D, Jurim O, Gross D, Reissman P. Laparoscopic vs open adrenalectomy for benign adrenal neoplasm. *Surg Endosc*. 2001;15:1356–1358.
7. MacGillivray DC, Shichman SJ, Ferrer FA, Malchoff CD. A comparison of open vs laparoscopic adrenalectomy. *Surg Endosc*. 1996;10:987–990.
8. Farres H, Felsher J, Brodsky J, Siperstein A, Gill I, Brody F. Laparoscopic adrenalectomy: a cost analysis of three approaches. *J Laparoendosc Adv Surg Tech A*. 2004;14:23–26.
9. Linos DA. Laparoscopic right adrenalectomy. *Operative Techniques in General Surgery*. 2002;4:304–308.
10. Berber E, Siperstein AE. Laparoscopic retroperitoneal adrenalectomy: posterior approach. *Operative Techniques in General Surgery*. 2002;4:331–337.
11. Duh QY, Siperstein AE, Clark OH, et al. Laparoscopic adrenalectomy. Comparison of the lateral and posterior approaches. *Arch Surg*. 1996;131:870–875.
12. Lezoche E, Guerrieri M, Feliciotti F, et al. Anterior, lateral, and posterior retroperitoneal approaches in endoscopic adrenalectomy. *Surg Endosc*. 2002;16:96–99.
13. Gagner M, Garcia-Ruiz A. Technical aspects of minimally invasive abdominal surgery performed with needlescopic instruments. *Surg Laparosc Endosc*. 1998;8:171–179.
14. Gill IS, Soble JJ, Sung GT, Winfield HN, Bravo EL, Novick AC. Needlescopic adrenalectomy - the initial series: comparison with conventional laparoscopic adrenalectomy. *Urology*. 1998;52:180–186.

15. Marescaux J, Dallemagne B, Perretta S, Wattiez A, Mutter D, Coumaros D. Surgery without scars: report of transluminal cholecystectomy in a human being. *Arch Surg*. 2007;142:823–6.
16. Branco AW, Branco Filho AJ, Kondo W, et al. Hybrid transvaginal nephrectomy. *Eur Urol*. 2008;53:1290–1294.
17. Kondo W, Noda RW, Branco AW, Rangel M, Branco Filho AJ. Transvaginal endoscopic tubal sterilization. *J Laparoendosc Adv Surg Tech A*. 2009;19:59–61.
18. Perretta S, Allemann P, Asakuma M, Dallemagne B, Marescaux J. Adrenalectomy using natural orifice transluminal endoscopic surgery (NOTES): A transvaginal retroperitoneal approach. *Surg Endosc*. 2009;23(6):1390. Epub 2009 Mar 5.
19. Branco AW, Kondo W, Stunitz LC, Filho AJ, de George MA. Transumbilical laparoscopic urological surgery: are special devices strictly necessary? *BJU Int*. 2009;104(8):1136–142. Epub 2009 Mar 26.
20. Walz MK, Alesina PF. Single access retroperitoneoscopic adrenalectomy (SARA) - one step beyond in endocrine surgery. *Langenbecks Arch Surg*. 2009;394(3):447–4450. Epub 2008 Sep 11.
21. Ng CS, Abreu SC, Abou El-Fettouh HI, et al. Right retroperitoneal versus left transperitoneal laparoscopic live donor nephrectomy. *Urology*. 2004;63:857–861.
22. Bachmann A, Dickenmann M, Gürke L, Giannini O, Langer I, Gasser TC, Steiger J, Sulser T. Retroperitoneoscopic living donor nephrectomy: a retrospective comparison to the open approach. *Transplantation*. 2004;78(1):168–171.
23. Buell JF, Abreu SC, Hanaway MJ, et al. Right donor nephrectomy: a comparison of hand-assisted transperitoneal and retroperitoneal laparoscopic approaches. *Transplantation*. 2004;77:521–525.
24. Raman JD, Bensalah K, Bagrodia A, Stern JM, Cadeddu JA. Laboratory and clinical development of single keyhole umbilical nephrectomy. *Urology*. 2007;70:1039–1042.
25. Gill IS, Cherullo EE, Meraney AM, Borsuk F, Murphy DP, Falcone T. Vaginal extraction of the intact specimen following laparoscopic radical nephrectomy. *J Urol*. 2002;167:238–241.
26. Gill IS, Canes D, Aron M, et al. Single port transumbilical (E-NOTES) donor nephrectomy. *J Urol*. 2008;180:637–641.
27. Gettman MT, Box G, Averch T, et al. Consensus statement on natural orifice transluminal endoscopic surgery and single-incision laparoscopic surgery: heralding a new era in urology? *Eur Urol*. 2008;53:1117–1120.
28. Gopan T, Remer E, Hamrahian AH. Evaluating and managing adrenal incidentalomas. *Cleve Clin J Med*. 2006;73:561–568.
29. Desai MM, Rao PP, Aron M, et al. Scarless single port transumbilical nephrectomy and pyeloplasty: first clinical report. *BJU Int*. 2008;101:83–88.
30. Canes D, Desai MM, Aron M, et al. Transumbilical single-port surgery: evolution and current status. *Eur Urol*. 2008;54:1020–1029.
31. Kaouk JH, Haber GP, Goel RK, et al. Single-port laparoscopic surgery in urology: initial experience. *Urology*. 2008;71:3–6.